

N.P.D. °	H-C.		
	Direct. "	Indirect. "	Mean. "
120	+ 1'10	+ 1'37	+ 1'24
122	+ 1'05	+ 1'40	+ 1'23
124	+ 0'90	+ 1'43	+ 1'17
128	+ 0'60	+ 1'31	+ 0'96
132	+ 0'20	+ 0'85	+ 0'53
136	- 0'09	+ 0'30	+ 0'11
140	- 0'25	- 0'05	- 0'15
144	0'00	- 0'09	- 0'05
148	- 0'01	- 0'34	- 0'18
152	- 0'10	- 0'78	- 0'44
156	- 0'15	- 0'76	- 0'46
160	- 0'10	- 0'54	- 0'32
164	- 0'08	- 0'63	- 0'36
168	- 0'20	- 0'73	- 0'47
172	- 0'23	- 0'63	- 0'43
176	- 0'25	- 0'35	- 0'30
180	- 0'23	+ 0'07	- 0'08

Greenwich,
1878, December 9.

Professor Safford has kindly pointed out to me an *Erratum* in the proper motion in R.A. of 35 *Ceti*, as given in *Monthly Notices*, vol. xxxviii., p. 518. The corrected quantities are :

Mean Annual Motion	+ 3 ^s ·0661
Proper Motion in R.A.	- 0'·0142.

Greenwich,
1878, December 9.

Total Eclipse of the Sun, July 29, 1878.

By W. H. Pickering, Esq.

The eclipse was observed by me at Cherry Creek, two and a quarter miles south-west of Denver, Colorado. The instruments used were two Arago polariscopes (the same used by my brother, Professor E. C. Pickering, in 1869 and 1870) and a polarimeter lent me by Mr. Ranyard. The smaller polariscope consisted of a double-image prism and a selenite plate. It was twelve inches in length, one inch in diameter, and 4° 45' field, giving red and

green colours. The larger polariscope was composed of a double-image prism and a quartz plate rotating to the left, giving blue and yellow. It was nineteen inches long, the quartz was one inch in diameter, and gave a field of 3° . The polarimeter consisted of two quartz wedges giving Savart's bands and a Nicol's prism, and these were neutralised by four crown-glass plates turning on a horizontal axis. The tube was nine inches in length and $\frac{3}{4}$ inch in diameter, giving a field of $4^\circ 40'$. The object of taking two Arago polariscopes was that the larger one, in 1869 in the hands of my brother, and in 1870 with Mr. W. O. Ross, had shown the corona wholly unpolarised, while the smaller instrument, at the same eclipse in 1870 with my brother, had shown the corona polarised radially. By taking both instruments and using first one and then the other, I hoped to obtain a clue to these contradictory results. Prior to the eclipse, in order to practise myself in observing radially polarised light, I had imitated this condition by laying a glass funnel on a looking glass, and reflecting the light of the sky through it. The light was thus strongly polarised—tangentially, however, instead of radially; but the effect was the same, only with the colours reversed. The artificial corona was thus seen surrounded by the blue background of the sky, which gave the usual polarisation.

The instant totality came on I observed the corona through the selenite polariscope, and found it radially polarised, but the colours were rather faint. They were the same above and below and complementary on either hand. I next took up the larger polariscope, and obtained a similar result. The right-hand image with vertically polarised light is blue when a mark upon the tube of the instrument is held uppermost. In this case, however, the right-hand image of the corona was green above and below and red on either hand, no other colours being visible. I next swept the instrument around the sky about 40° above the horizon. In determining the plane of polarisation I revolved the tube about its own axis until the image to the right of the mark attained its characteristic blue, and the other the characteristic yellow tint; the plane of polarisation then passed through the line separating the two images. The Sun at this time was nearly due west and about 40° above the horizon. When the instrument was pointed north and at the same altitude as the Sun the polarisation was nearly horizontal, and seemed to lie in a plane passing through the Sun. When pointed to the south I obtained the same result. I was surprised not to find it vertical, and repeated both observations, but with the same result. On pointing the instrument east I found the polarisation vertical, but could distinguish none whatever at the zenith. I looked very carefully at this point. I next took up the polarimeter and observed the sky about 10° to the right of the Sun and also 10° below it. In the hurry of the moment I held the instrument vertically, instead of first bringing the bands to a maximum and

then neutralising them with the glass plates. At 10° to the right I found the lines disappear when the plates were inclined 8° . At 10° below the lines were faintest at 2° .

I noticed that the night hawks came out shortly before totality and disappeared soon after. Just as totality was over I observed a number of shadowy bands on the ground. They were about a yard broad and two yards apart, and had a slightly wavering motion. They were very conspicuous and lasted nearly a minute. These estimates were made from memory immediately after the bands had disappeared.

In order to account for the colours as seen through the quartz polariscope, I have investigated the subject further by means of my funnel and mirror. I have found that when the light is only slightly polarised the blue and yellow, although in broad sectors, are not so conspicuous as the red and green, and that the green in the left-hand image, although not distributed vertically, is more nearly so than it is horizontally. My observation, if interpreted rigorously, would indicate a polarisation something between radial and tangential; but inasmuch as the colours were very faint, a slight variation on one side or the other of the vertical would hardly have been noticed, and I think it is safe to regard the result as denoting slight radial polarisation.

It is rather difficult to interpret my observations on sky polarisation. If we could discard the north and south observations, they would indicate radial polarisation from the zenith as a centre. On the other hand, accepting these and discarding the zenith observation, we have radial polarisation from the Sun. Finally, accepting these three as correct and disregarding the east observation, we have the sky horizontally polarised. The best interpretation which occurs to me is to suppose the sky not polarised merely from the zenith as a centre, nor merely from the Sun, but from both. In this case the polarisation in the east would be marked, which was true; in the zenith and in the neighbourhood of the Sun it would be very faint (the latter is shown by my polarimeter observations); and in the north and south the plane would lie neither in the direction of the zenith nor of the Sun, but somewhere between the two. In regard to my polarimeter observations: taking the one made 10° to the right of the Sun, it is evident that there was no perceptible horizontal polarisation or the lines would not have disappeared; and the vertical polarisation, if any, must have been very slight, as indicated by the number of degrees. The second observation, made 10° below the Sun, indicates no vertical, and perhaps very slight horizontal, polarisation.